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| 10/779,302 | 02/12/2004 | Chun-Po Chen | JCLA10577 | 7413 |

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| EXAMINER | |
|---|---|
| TSAI, SHENG JEN | |
| ART UNIT | PAPER NUMBER |
| 2186 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 01/11/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/779,302 | CHEN, CHUN-PO | |
| | Examiner | Art Unit | |
| | Sheng-Jen Tsai | 2186 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. This Office Action is taken in response to Applicants' Amendments and Remarks filed on November 28, 2006 regarding application 10,779,302 filed on February 12, 2004.

2. Claims 1-2, 6-7, 9-13, and 15-20 have been amended.

Claims 1-20 are pending for consideration.

3. ***Response to Remarks and Amendments***

Applicants' remarks have been fully and carefully considered with examiner's response set forth below.

(1). Applicant amends independent claims 1, 7, 13 and 19 with the additional limitation that "the storage system is externally coupled to the main system." However, this amended limitation lacks the support from the written description of Applicant's disclosure (Chen, US Patent Application Publication 2004/0177226).

The Examiner searches the above Patent Application Publication, and the only reciting regarding the coupling between the storage system and the main system is "the storage system is electrically connected to a main system" as appeared in abstract, paragraph [0009], paragraph [0019], and paragraph [0024]. The entire disclosure is silent about that "the storage system is externally coupled to the main system." It should be noted that being "electrically coupled to" is not the same as being "externally coupled to."

Further, Applicant contends in the remark that "figure 1 of Applicant's invention teaches that the data storage system 150 is coupled to the main system 100."

According to figure 1 of Applicant's invention, the main system comprises a CPU and a memory; while figure 1 of the reference (Grummon et al., US 6,341,341) also shows that the storage controller 112 is external to the combination of the CPU 108 and the memory unit 106 (i.e., the main system by Applicant's definition). Thus, even if the limitation of "externally coupled to" is supported by the written description, which is not the case as explained earlier, it would have been taught by Grummon et al. anyway.

(2). Applicant contends that Grummon et al. do not teach the limitation of "backing up each different previously stored data from the first data block to te second data block." The Examiner disagrees with this assessment for the following reasons.

First, the Examiner cited column 6, lines 23-36 in the Office Action mailed on 08/29/2006 as one of the supporting evidence of this limitation by the reference, not just column 6, lines 30-32 as Applicant indicates.

Second, column 6, lines 23-36 of Grummon et al. clearly state that "the container manager copies the unmodified block from the read-write container 210 to the backing store container 212 through the backing store container driver 212. The container manager sets the modified-bit-map table 214 for that block, and sends the I/O request to the read-write container 210 driver for storage in the read-write container 210."

It should be noted that there are two actions taking place here. First, the container manager copies the unmodified block from the read-write container 210 to the backing store container 212 through the backing store container driver 212. Second, The container manager sets the modified-bit-map table 214 for that block, and sends the I/O request to the read-write container 210 driver for storage in the read-write

container 210. In other words, the old data previous stored in the read-write container 210 is copied into the backing store container 212, and then the new data from the main system is stored in the read-write container 210. This is what Grummon et al. referred to as the "Copy-On-Write" approach [column 5, lines 55-56].

Third, figure 2 of Grummon et al. further illustrates this scenario by showing that the coping of old data from the read-write container 210 to the backing store container 212 (denoted by arrow A) takes place before new data is written into the read-write container 210 (denoted by arrow B).

Fourth, more detailed description of this operation is provided in column 5, lines 55-67 and column 6, lines 1-65.

(3). Therefore, the Examiner's position regarding the merits of patentability of claims 1, 7, 13 and 19, and all those claims dependent from them, remains the same as states in the previous Office Action.

***Claim Rejections - 35 USC § 112***

**4.** The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

**5.** Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claims 1, 7, 13 and 19 are amended with the additional limitation that "the storage system is externally coupled to the main system." However, this amended limitation lacks the support from the written description of Applicant's disclosure (Chen, US Patent Application Publication 2004/0177226).

The Examiner searches the above Patent Application Publication, and the only reciting regarding the coupling between the storage system and the main system is "the storage system is electrically connected to a main system" as appeared in abstract, paragraph [0009], paragraph [0019], and paragraph [0024]. The entire disclosure is silent about that "the storage system is externally coupled to the main system." It should be noted that being "electrically coupled to" is not the same as being "externally coupled to."

Claims 2-6, 8-12, 14-18 and 20 are rejected by virtue of their dependency from claims 1, 7, 13 and 19, respectively.

***Claim Rejections - 35 USC § 102***

**6.** The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**7.** Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Grummon et al. (US 6,341,341).

As to claim 1, Grummon et al. disclose **a storage system** [figure 1] **with a snapshot-backup capability** [System and Method for Disk Control with Snapshot

Feature Including Read-Write Snapshot Half (title); figure 2 shows the backup application (204)] **externally coupled to a main system** [figure 1 shows the corresponding main system comprising a CPU (108) and a memory unit (106), and the corresponding storage system (112) is external to the combination of the CPU and the memory unit; also refer to "Response to Remarks and Amendments" presented earlier in this Office Action], **comprising**:

**a storage device** [figure 1 shows a plurality of storage devices in the form of on-line disk] **including at least a first data block** [the corresponding first block is the read-write on-line container (figure 2, 210); The on-line storage devices on a computer are configured from one or more disks into logical units of storage space referred to herein as "containers." Examples of containers include volume sets, stripe sets, mirror sets, and various Redundant Array of Independent Disk (RAID) implementations (column 1, lines 30-35)] **and a second data block** [the corresponding second block is the backing store container (figure 2, 212)] **in response to the first data block** [figure 2 shows the relationship between the read-write on-line container (figure 2, 210) and the backing store container (figure 2, 212)]; **and**

**a storage controlling unit** [the corresponding storage controlling unit is the I/O subsystem (figure 1, 112; figure 2, 112) comprising a container manager (figure 1, 201) and a container layer (figure 1, 200)] **for receiving at least a newly stored data transmitted from the main system** [figure 1 shows that data to be stored originates from the memory unit (figure 1, 106) of the main system (figure 1, 100) and enters the on-line disks via the I/O subsystem (figure 1, 112); if the request is a storage request

(i.e., data to be written into the storage devices) ... (column 6, lines 23-36)] **in accordance with distribution of each data in said data blocks of the storage device** [When a software process issues an I/O request, the operating system accepts the I/O request and translates it into an I/O request bound for a particular device. The operating system sends the I/O request which includes, inter alia, a block number for the first block of data requested by the application and also a pointer to a Device Switch Table entry which points to a container driver for the container where the requested data is stored. The container driver accesses the Container Array entry for pointers to the data structures used in that container and to Partition Table entries for that container. Based on the information in the data structures, the container driver also accesses Partition Table entries to obtain the starting physical locations of the container on the storage devices. Based on the structures pointed to by the Container Array entry and partition structures in the Partition Table, the container driver sends the I/O request to the appropriate disk drivers for access to the disk drives (column 2, lines 26-43)], **determining whether there is any difference found between the newly stored data and at least a previously stored data located in the first data block** [However for all I/O requests to modify data in a read-write container, the container manager first determines whether the requested block of data has been modified since the time of the snapshot (column 3, lines 32-35)], **thereby backing up each different previously stored data from the first data block to the second data block** [If the request is a storage request, the system checks the modified-bit-map table 214 to determine if the read-write container's block of data was modified after the snapshot

container 208 was created. If the block has been modified, the modified bit is set. Therefore, the snapshotted container 206 forwards the I/O request to the read-write on-line container 210 driver. If however, the block was not modified after snapshot container 208 was created, the container manager copies the unmodified block from the read-write container 210 to the backing store container 212 through the backing store container driver 212. The container manager sets the modified-bit-map table 214 for that block, and sends the I/O request to the read-write container 210 driver for storage in the read-write container 210 (column 6, lines 23-36)], **and then storing the corresponding different newly stored data to the first data block where the different previously stored data is located as long as there is any one different data found between the newly and previously stored data** [If the request is a storage request, the system checks the modified-bit-map table 214 to determine if the read-write container's block of data was modified after the snapshot container 208 was created. If the block has been modified, the modified bit is set. Therefore, the snapshotted container 206 forwards the I/O request to the read-write on-line container 210 driver. If however, the block was not modified after snapshot container 208 was created, the container manager copies the unmodified block from the read-write container 210 to the backing store container 212 through the backing store container driver 212. The container manager sets the modified-bit-map table 214 for that block, and sends the I/O request to the read-write container 210 driver for storage in the read-write container 210 (column 6, lines 23-36)].

As to claim 2, Grummon et al. teach that **the storage device consists of a multi disk array** [figure 1 shows a plurality of storage devices in the form of on-line disk].

As to claim 3, Grummon et al. teach that **the distribution of each data stored in said data blocks of the storage device is recorded in a block-mapping table** [The operating system 104 sends I/O requests to a I/O subsystem 112 which, in turn, converts the logical addresses into physical locations in the storage devices 116 and commands the latter devices to engage in the requested storage or retrieval operations. The I/O subsystem 112 configures the partitions of the physical storage devices 116 into containers and stores container configuration tables in the container layer 120 of the I/O subsystem 112. Container configuration enables the system administrator to partition a disk drive into one or more virtual disks. A container manager 118 operates in association with the I/O subsystem 112 (column 5, lines 35-45); When a software process issues an I/O request, the operating system accepts the I/O request and translates it into an I/O request bound for a particular device. The operating system sends the I/O request which includes, inter alia, a block number for the first block of data requested by the application and also a pointer to a Device Switch Table entry which points to a container driver for the container where the requested data is stored. The container driver accesses the Container Array entry for pointers to the data structures used in that container and to Partition Table entries for that container. Based on the information in the data structures, the container driver also accesses Partition Table entries to obtain the starting physical locations of the container on the storage devices. Based on the structures pointed to by the Container

Array entry and partition structures in the Partition Table, the container driver sends the I/O request to the appropriate disk drivers for access to the disk drives (column 2, lines 26-43)].

As to claim 4, Grummon et al. teach that **the backup process of the different previously stored data of the first data block to the second data block is recorded in the block-mapping table** [The operating system 104 sends I/O requests to a I/O subsystem 112 which, in turn, converts the logical addresses into physical locations in the storage devices 116 and commands the latter devices to engage in the requested storage or retrieval operations. The I/O subsystem 112 configures the partitions of the physical storage devices 116 into containers and stores container configuration tables in the container layer 120 of the I/O subsystem 112. Container configuration enables the system administrator to partition a disk drive into one or more virtual disks. A container manager 118 operates in association with the I/O subsystem 112 (column 5, lines 35-45); When a software process issues an I/O request, the operating system accepts the I/O request and translates it into an I/O request bound for a particular device. The operating system sends the I/O request which includes, inter alia, a block number for the first block of data requested by the application and also a pointer to a Device Switch Table entry which points to a container driver for the container where the requested data is stored. The container driver accesses the Container Array entry for pointers to the data structures used in that container and to Partition Table entries for that container. Based on the information in the data structures, the container driver also accesses Partition Table entries to obtain the

starting physical locations of the container on the storage devices. Based on the structures pointed to by the Container Array entry and partition structures in the Partition Table, the container driver sends the I/O request to the appropriate disk drivers for access to the disk drives (column 2, lines 26-43)].

As to claim 5, Grummon et al. teach that **the storing process of the corresponding different newly stored data to the first data block is recorded in the block-mapping table** [The operating system 104 sends I/O requests to a I/O subsystem 112 which, in turn, converts the logical addresses into physical locations in the storage devices 116 and commands the latter devices to engage in the requested storage or retrieval operations. The I/O subsystem 112 configures the partitions of the physical storage devices 116 into containers and stores container configuration tables in the container layer 120 of the I/O subsystem 112. Container configuration enables the system administrator to partition a disk drive into one or more virtual disks. A container manager 118 operates in association with the I/O subsystem 112 (column 5, lines 35-45); When a software process issues an I/O request, the operating system accepts the I/O request and translates it into an I/O request bound for a particular device. The operating system sends the I/O request which includes, inter alia, a block number for the first block of data requested by the application and also a pointer to a Device Switch Table entry which points to a container driver for the container where the requested data is stored. The container driver accesses the Container Array entry for pointers to the data structures used in that container and to Partition Table entries for that container. Based on the information in the data structures, the container driver

also accesses Partition Table entries to obtain the starting physical locations of the container on the storage devices. Based on the structures pointed to by the Container Array entry and partition structures in the Partition Table, the container driver sends the I/O request to the appropriate disk drivers for access to the disk drives (column 2, lines 26-43)].

As to claim 6, Grummon et al. teach that **the storage controlling unit includes at least a chip controller and embedded driver software** [the corresponding storage controlling unit is the I/O subsystem (figure 1, 112; figure 2, 112) comprising a container manager (figure 1, 201) and a container layer (figure 1, 200); Each container is controlled by an associated container driver that processes I/O requests for that container. For the purposes of this description the driver is assumed to be present on the container or within an associated application or on the adapter for controlling the RAID functionalities. Furthermore the adapter, drivers and other functionalities of this system can be implemented as hardware, software or a combination of both. When referring to a given container herein (for simplicity), the description thereof is also deemed to include the associated driver and other required adapter functionalities (column 5, lines 59-67); further, figure 1 shows that the I/O subsystem (112) directly controls the memory chip (106), hence performing the functions of a chip controller to control the memory chips].

As to claim 7, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 8, refer to "As to claim 2" presented earlier in this Office Action.

As to claim 9, refer to "As to claim 3" presented earlier in this Office Action.

As to claim 10, refer to "As to claim 4" presented earlier in this Office Action.

As to claim 11, refer to "As to claim 5" presented earlier in this Office Action.

As to claim 12, refer to "As to claim 6" presented earlier in this Office Action.

As to claim 13, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 14, refer to "As to claim 2" presented earlier in this Office Action.

As to claim 15, refer to "As to claim 3" presented earlier in this Office Action.

As to claim 16, refer to "As to claim 4" presented earlier in this Office Action.

As to claim 17, refer to "As to claim 5" presented earlier in this Office Action.

As to claim 18, refer to "As to claim 6" presented earlier in this Office Action.

As to claim 19, refer to "As to claim 1" presented earlier in this Office Action.

As to claim 20, refer to "As to claim 1" presented earlier in this Office Action.

8. ***Related Prior Art of Record***

The following list of prior art is considered to be pertinent to applicant's invention, but not relied upon for claim analysis conducted above.

- Franklin, (US 6,061,770), "System and Method for Real-Time Data Backup Using Snapshot Copying with Selective Compaction of Backup Data."
- Sawdon et al., (US 6,748,504), "Deferred Copy-on-Write of a Snapshot."
- Kusters et al., (US 6,473,775), "System and Method for Growing Differential File on a Base Volume of a Snapshot."
- Kusters et al., (US Patent Application Publication 2004/0133602), "Optimizing Defragmentation Operations in a Differential Snapshotter."

***Conclusion***

9. Claims 1-20 are rejected as explained above.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheng-Jen Tsai whose telephone number is 571-272-4244. The examiner can normally be reached on 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Kim can be reached on 571-272-4182. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sheng-Jen Tsai
Examiner
Art Unit 2186

December 31, 2006

PIERRE BATAILLE
PRIMARY EXAMINER
1/4/07